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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,047	10/17/2003	Chung Foong Tan	CS03-021	9186

7590 09/28/2005

GEORGE O. SAILE
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EXAMINER

GUERRERO, MARIA F

ART UNIT PAPER NUMBER

2822

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/688,047

Applicant(s)

TAN ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14-19, 26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-19 and 26-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to the Amendment filed July 18, 2005.

Status of Claims

2. Claims 13 and 20-25 are canceled. Claims 1-12, 14-19 and 26-27 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Babcock et al. (US 2002/0033511).
4. Babcock et al. shows providing a bulk silicon substrate (10), depositing a carbon-doped silicon layer (160) on the bulk silicon substrate (10), and growing an epitaxial silicon layer (170) overlying the carbon-doped silicon layer (160) to provide a starting wafer for integrated circuit fabrication (Fig. 3a-4b, paragraphs 0016-0017). Babcock et al. teaches forming a gate electrode on the starting wafer (Fig. 3b-4b). Babcock et al.

discloses implanting LDD and source/drain regions in the starting wafer adjacent to the gate electrode (Fig. 3b-4b, paragraphs 0016-0017).

5. Furthermore, Babcock et al. describes implanting a heavy ion to form halo implants adjacent to the LDD regions and underlying the gate electrode (Fig. 4a-4b, paragraph 0017). Babcock et al. shows the halo implants extending to an interface between the epitaxial silicon layer and the carbon-doped silicon layer (Fig. 4a-4b, paragraph 0017).

6. Claims 1, 3, 5-7, 9, 11-12, 14, 16, 18-19 and 26-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Mansori et al. (US 6,830,980).

7. Mansori et al. shows providing a bulk silicon substrate (12), depositing a carbon-doped silicon layer (20) by chemical vapor deposition on the bulk silicon substrate (12), and growing an epitaxial silicon layer (21) overlying the carbon-doped silicon layer (20) to provide a starting wafer for integrated circuit fabrication (Fig. 1-3, col. 5, lines 3-30). Mansori et al. teaches forming a gate electrode on the starting wafer (col. 8, lines 18-25). Mansori et al. discloses implanting LDD and source/drain regions in the starting wafer adjacent to the gate electrode (col. 8, lines 18-36).

8. Furthermore, Mansori et al. describes implanting a heavy ion (indium or antimony) to form halo implants adjacent to the LDD regions and underlying the gate electrode (Fig. 16-17, col. 1, lines 28-40, col. 8, lines 25-40). Mansori et al. shows the halo implants extending to an interface between the epitaxial silicon layer and the carbon-doped silicon layer (Figs. 15-17, col. 8, lines 25-40). Mansori et al. teaches the carbon-doped silicon layer having a thickness about 10-1000 Angstroms, for example

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about 100-500 Angstroms (col. 5, lines 2-30). Mansori et al. shows the epitaxial silicon layer having a thickness about 400-500 Angstroms (col. 5, lines 29-32).

9. Mansori et al. teaches the carbon-containing region being formed to inhibit diffusion of dopants during fabrication (Abstract, col. 2, lines 19-60, col. 4, lines 25-47).

Therefore, the purposed of prevent end of range secondary defect formation is inherently disclosed by Mansori et al.

10. In addition, the elements must be arranged as required by the claim, but this is not an *ipse dixit* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

11. Furthermore, there is no requirement that a person of ordinary skill in the art would have recognized the inherent disclosure at the time of invention, but only that the subject matter is in fact inherent in the prior art reference. *Schering Corp. v. Geneva Pharm. Inc.*, 339 F.3d 1373, 1377, 67 USPQ2d 1664, 1668 (Fed. Cir. 2003). See also *Toro Co. v. Deere & Co.*, 355 F.3d 1313, 1320, 69 USPQ2d 1584, 1590 (Fed. Cir. 2004).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2, 4, 8, 10, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mansori et al. (US 6,830,980) in view of Takahashi (U.S. 6,743,704).

Mansori et al. describes the carbon concentration of about 0.1 atomic percent or more (col. 5, lines 10-15).

Mansori et al does not specifically show the carbon content of up to 0.5% as claimed. Mansori et al does not specifically describe the chemical vapor deposition being at reduce pressure. However, Takahashi shows depositing a carbon-doped silicon layer by reduce pressure chemical vapor deposition and having a carbon content of up to 0.5% (col. 6, lines 8-15, 30-37).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Mansori et al. reference by specifying the carbon content of up to 0.5% and the chemical vapor deposition being at reduce pressure as taught by Takahashi because Mansori et al. suggested that the carbon concentration could be more than 0.1 atomic percent (col. 5, lines 10-15). There is not evidence of criticality; therefore, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA

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1955). In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g).

Response to Arguments

13. Applicant's arguments filed July 18, 2005 have been fully considered but they are not persuasive. Claims 1-12, 14-19 and 26-27 stand rejected.

14. Applicant argued that Babcock et al. does not teach depositing a carbon-doped layer on a silicon substrate, growing an epitaxial silicon layer where halo implants extend to an interface between the epitaxial silicon layer and the carbon-doped layer. However, Babcock et al. shows providing a bulk silicon substrate (10), depositing a carbon-doped silicon layer (160) on the bulk silicon substrate (10), and growing an epitaxial silicon layer (170) overlying the carbon-doped silicon layer (160) to provide a starting wafer for integrated circuit fabrication (Fig. 3a-4b, paragraphs 0016-0017). In addition, Babcock et al. shows the halo implants extending to an interface between the epitaxial silicon layer and the carbon-doped silicon layer (Fig. 4a-4b, paragraph 0017).

15. Applicant argued that Masoori's halo implants are implanted within the carbon-doped layer not within the epitaxial silicon layer. However, Mansori et al. shows the halo implants extending to an interface between the epitaxial silicon layer and the carbon-doped silicon layer and the halo implants being within the epitaxial silicon layer (Figs. 15-17, col. 8, lines 25-40).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention

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where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Takahashi is cited as evidence to show that depositing a carbon-doped silicon layer by reduced pressure chemical vapor deposition and having a carbon content of up to 0.5% is well known in the art (col. 6, lines 8-15, 30-37).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that to prevent end range secondary defect formation is not disclosed by the references, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Drobny et al. (US 6,576,535) (of record) and Ishida et al. (US

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6,198,157) show the step of depositing a carbon-doped layer on a bulk silicon substrate as conventional in the art.

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 20, 2005

Maria Guerrero
MARIA F. GUERRERO
PRIMARY EXAMINER